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and $n \times \Delta y$ corresponding to that point is not a variable product having a constant quantity as a limit, but one that decreases indefinitely without limit as n increases without limit and Δy correspondingly diminishes. $n \times \Delta y$ for the point Q is not a constant quantity and is not a variable having a constant quantity as a limit. If either of these things be essential to a differential of y and hence to a differential co-efficient, then there can be no differential of y and no differential co-efficient corresponding to the point Q .

But does not the perpendicular to CQ at the point Q make a zero angle with the axis of abscissas? According to both Euclid and Lobatschewsky the two lines perpendicular to the radius CQ do not meet. If lines that make an angle with each other always meet, the perpendiculars to CQ do not make an angle.

What is a zero angle? Is it the ghost of a departed quantity that the Bishop of Cloyne tells about?

ARITHMETIC.

Conducted by B. F. FINKEL, Kidder, Mo. All contributions to this department should be sent to him.

SOLUTIONS TO PROBLEMS.

25. Proposed by L. B. HAYWARD, Superintendent of Schools, Bingham, Ohio.

A company engaged an agent to do business for one month at a salary of \$25, giving him goods amounting to \$57.54 and \$32.17 in cash to start with. The agent bought during the month, goods amounting to \$59.91. At the end of the month the goods on hand amounted to \$31.67, and the amount of sales for the month was \$102.97; what was the balance of account?

Solution by W. F. BRADBURY, A. M., Head-Master, Cambridge Latin School, Cambridge, Massachusetts.

Cash received.....	\$32.17
Cash for sales.....	\$102.97
Cash total.....	<u>\$135.14</u>
Cash spent.....	\$59.91
Cash on hand.....	<u>\$75.23</u>
Salary of agent.....	<u>\$25.00</u>
Goods to be returned and cash....	\$50.23

It is assumed that the agent paid for the goods he bought and re-

ceived cash for the sales made. If not, the agent turns over the debits and credits and if the accounts can be collected it is all the same.

The company came out as follows:

When the agent began,	Assets
Cash.....	\$50.23
Goods.....	\$31.67
Total.....	\$81.90

Loss, \$89.71—\$81.90=\$7.81.

Also solved by *Hon. J. H. DRUMMOND*.

26. Proposed by *E. S. LOOMIS, A. M., Ph. D., Professor of Mathematics, Baldwin University, Berea, Ohio.*

You say, "While treating of the pronunciation of those who minister in public, two other words occur to me which are commonly mangled by our clergy. One of *these* (*A*) is 'covetous,' and its substantive 'covetousness.' I hope some who read *these lines* will be induced to leave off pronouncing *them* (*B*) 'covetious' and 'covetiousness.' I can assure *them* (*C*) that when *they* (*D*) do thus call *them* (*E*), one at least of *their* (*F*) hearers has his appreciation of *their* (*G*) teaching disturbed."

The problem now is, in how many ways can this above quotation be (read or) understood, by supposing various antecedents to the pronouns as per table.

The pronouns	Nouns to which they apply.	No. of nouns.
(<i>A</i>) these	Words, or clergy.	2
(<i>B</i>) them	Words, clergy, readers, or lines.	4
(<i>C</i>) them	Words, clergy, readers, or lines.	4
(<i>D</i>) they	Words, clergy, readers, or lines.	4
(<i>E</i>) them	Words, clergy, readers, or lines.	4
(<i>F</i>) their	Words, clergy, readers, or lines.	4
(<i>G</i>) their	Words, clergy, readers, lines, or hearers.	5

Solution by *Hon. JOSIAH H. DRUMMOND, Portland, Maine.*

"These" (*A*) may apply to 2; hence two readings: to each of these two, "them" (*B*) gives four readings: so that we have, $2 \times 4 = 8$ readings and so on through the paragraph and the whole number of readings will be the continued product of $2 \times 4 \times 4 \times 4 \times 4 \times 4 \times 5 = 10240$.

[Note.—The above problem with a solution may be found in *Bardeen's Complete Rhetoric*, page 415. Ed.]

27. Proposed by *F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland.*

A and *B* buy a ship for $S = \$80000$, of which *A* has the a/b th = $\frac{1}{2}$, and *B* the c/d th = $\frac{1}{3}$, interest. They sell *C* the m/n th = $\frac{1}{4}$ interest for $P = \$40000$; and then agree that *A* should retain the p/q th = $\frac{1}{2}$, and *B* the r/s th = $\frac{1}{3}$, interest. How is the purchase-money received from *C* to be divided between *A* and *B*?

I. Solution by the PROPOSER.

Obviously *A* sold to *C* the m/n th of the a/b th part, = $\frac{1}{2} \times \frac{1}{4}$ part, of the ship; and *B* sold to *C* the m/n th of the c/d th part, = $\frac{1}{3} \times \frac{1}{4}$ part, of the ship. Before entering upon their agreement specified in the problem, *A*'s part of the purchase-money received from *C* would have been (a/b) of $\$P = \25000 ; and *B*'s part would have been (c/d) of $\$P = \15000 . In order to possess himself of